## Abstract

We propose to measure the reaction $\vec{\gamma} + p \rightarrow p + \phi$ with $\phi \rightarrow K^+K^-$ in the photon energy range of $1.9 < E_\gamma < 2.2$ GeV by tagging the incident photon energy and detecting the final-state proton in coincidence with the decay $K^+$ in the CLAS detector. The photons will be produced by coherent bremsstrahlung from a 4 GeV (6 GeV) electron beam incident on a diamond radiator, and will provide an average polarization of 65% (80%). The proposal to build the Coherent Bremsstrahlung Facility has been approved. The reaction can be completely specified by 12 complex density matrix elements composed of 17 independent, real functions of which 11 are measureable. The use of a linearly polarized beam of photons will allow for the extraction of nine of these functions by measuring the angular distributions of the decay kaons for each value of the 4-momentum transfer squared ($t$). The maximum value of $t$ is $-2.0$ (GeV/c)$^2$ and the experiment will obtain data with good statistics up to about $-1.2$ (GeV/c)$^2$. The evolution of these density matrix elements as a function of $t$ will quantify the contributions to the production amplitude due to either diffractive scattering or pseudo-scalar meson exchange. Presently existing data from a bubble-chamber experiment are consistent with diffractive scattering but have poor statistical accuracy. If either the diffractive mechanism or the pseudo-scalar meson exchange dominates the cross section, we expect that all but two of these nine density matrix elements will be identically equal to zero. Significant departure of any of the other seven quantities from zero will indicate new production channels. We ask for 500 hours of beam time (100 hours with 4 GeV beam and the rest at 6 GeV) that should be contiguous with the time already approved for experiment E94-109 in the $\gamma 8$ CLAS run period.